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REVIEWS AND BOOK NOTICES

An Introduction to Astronomy. By FOREST RAY MOULTON. London-New York: The Macmillan Co., 1906. Pp. 557.

As geology is the domestic chapter of astronomy, the broad-minded geologist cannot be indifferent to the appearance of a synoptical treatise which brings within easy reach the essential advances in this old but ever new and fascinating science. Dr. Moulton's book is eminently opportune and welcome, since it covers in clear and firm terms those phases of astronomy which are just now most serviceable to the student of the genesis of the earth. In the first fourteen chapters the book sets forth the methods by which the science is developed, the important features of the solar system, and the mechanical principles involved in celestial dynamics. The selection of the matter is notable in that the most fundamental and essential facts are chosen, rather than those that are of most spectacular and superficial attractiveness. Perhaps in no other book of its kind is there so large a proportion of the things that it is essential for one to know, if one is to follow the progress of astronomical geology, as in this treatise, modestly styled an introduction to astronomy. And as these come from the hand of a specialist in celestial mechanics, they may be accepted with unusual confidence. A notable feature of the treatment is the close tying of facts to principles, by virtue of which the facts teach the principles, and the principles give the facts coherence and meaning, and help one to hold them.

On the firm grounding of facts set forth in the first fourteen chapters, the evolution of the solar system is discussed with a fulness and precision found in no other astronomical work of its grade. The views of Thomas Wright and Kant are briefly noticed, while those of Laplace, Lockyer and George Darwin are more fully treated. The facts that support the Laplacian view and its modifications are cited and set over against the facts inconsistent with it, especially those that have been developed by recent studies and discoveries. The planetesimal or spiral-nebular hypothesis is as fully set forth as the limits of such a work permit, and, naturally, as coming from one who has taken an essential part in its development, in an appreciative and sympathetic way. Dr. Moulton's treatment is in many respects different from that of Chamberlin, though completely in harmony with it, and to those to whom the mathematical form of treatment is helpful it will doubtless be found more acceptable. It may, however, be easily fol-

lowed by those who are not deeply versed in mathematics, as only the simpler formulæ are introduced. In the summary at the close of this chapter on evolution, after a word of warning that this theory should not be accepted as final, since many phenomena having a critical bearing upon it are yet to be developed, Dr. Moulton says:

The development of a spiral nebula by the near approach of two suns seems to be a necessary consequence, though this point needs further elaboration. The development of some such a system as ours from a small spiral nebula of the type considered seems to be inevitable. So far as the details have been worked out, nothing directly contradictory to the theory, or even seriously questioning it, has been found, while it explains admirably all the main features of the system. It can be safely said that, at present, this hypothesis satisfies all the requirements of a successful theory much better than any previous one.

The final chapter is devoted to stars and nebulae in which, as before, the selection of the important things is notable. The work is to be heartily commended to the geologist who wishes a brief and trustworthy summary of the recent developments in astronomical science. T. C. C.

A Preliminary Report on a Part of the Clays of Virginia. By HEINRICH RIES, PH.D. (Geological Survey of Virginia, Bulletin No. II, 1906.) Pp. 184, 15 plates, 10 figures.

The investigation of the clays of Virginia has been well begun, and when completed it is proposed to publish a volume on the clay industries of the state. So far attention has been confined to the coastal plain belt. The expressed purpose of this work is to determine (1) the extent, qualities, and applicability of the clays; and (2) whether the clays now being utilized could be used for making other and better products than are now being made from them. To this end many samples were collected and carefully investigated both chemically and physically. The results of these investigations together with instructive discussion of the origin, properties, and mode of occurrence of clay, methods of mining and manufacture, etc., are embodied in this report.

The first chapter, forming Part I of this report, treats of the "Geology of the Virginia Coastal Plain" and was contributed by William Bullock Clark and Benjamin LeRoy Miller. The interpretation of the Sunderland and other Pleistocene formations is given in unqualified terms as though unquestioned science, with no intimation to the reader that the interpretation is questioned and other interpretations advanced. The public are entitled to know the true state of the case. E. W. S.